

Claims

1. A slider displacement direction conversion mechanism in an electrostatic actuator comprising at least one electrostatic actuator which generates the electrostatic force parallel to a substrate surface, at least one slider which is displaced under the force from said electrostatic actuator, and at least one elastic beam fixed to the substrate supporting said slider,

wherein said elastic beam has a displaceable member which entirely or locally supports said slider, and

wherein said displaceable member is easily displaced in a direction different from a displacement direction when said slider is subjected to the force in said displacement direction.

2. A slider displacement direction conversion mechanism in an electrostatic actuator according to Claim 1,

wherein said elastic beam has a leaf spring structure in which one end of said elastic beam is fixed to said substrate in an inclined manner to the substrate surface, and the other end thereof is fixed to said slider, the entire elastic beam forms said displaceable member.

3. A slider displacement direction conversion mechanism in an electrostatic actuator according to Claim 1,

wherein said elastic beam has a strip-like projecting piece which is inclined to said substrate surface on both ends thereof, and

wherein said strip-like projecting pieces on both ends form said displaceable members, and said elastic beam is fixed to said substrate via

said other strip-like projecting piece.

4. A slider displacement direction conversion mechanism in an electrostatic actuator according to Claim 3,

wherein said strip-like projecting piece is formed by providing a notched portion in a part of said elastic beam.

5. A slider displacement direction conversion mechanism in electrostatic actuator according to any one of Claims 1 to 3,

wherein displaceable members of said elastic beam are disposed so as to be easily displaced in a predetermined direction, and a plurality of elastic beams having said displaceable members are disposed so that each displaceable member is easily displaced in the same direction.

6. A slider displacement direction conversion mechanism in an electrostatic actuator according to any one of Claims 1 to 3,

wherein displaceable members of said elastic beams are disposed so as to be easily displaced in a predetermined direction, the elastic beams having said displaceable members are disposed so as to support forward and rear portions of said slider, and said forward and rear elastic beams are disposed so that each displaceable member is easily displaced in different directions.

7. A slider displacement direction conversion mechanism in electrostatic actuator according to any one of Claims 1 to 3,

wherein said sliders comprise first and second sliders disposed parallel to each other, said first slider is supported by said substrate via the displaceable member of said elastic beam fixed to said substrate, and said second slider is supported by said first slider via the displaceable

member of the elastic beam, and

wherein driving forces in the reverse direction to each other are given from first and second electrostatic actuators to the first and second sliders so that the displacement in the direction parallel to the substrate surface of said second slider is canceled, and the displacement in the upwardly perpendicular direction with respect to the substrate surface is increased.

8. A slider displacement direction conversion mechanism in an electrostatic actuator according to Claim 7,

wherein two of said first sliders are supported in parallel to each other by said substrate via the displaceable member of the outer elastic beam fixed to said substrate,

wherein one of said two second sliders is disposed between said two first sliders, and said second slider is respectively supported by said two first sliders via the displaceable member of the inner elastic beam,

wherein the displaceable member of said outer elastic beam is a plate-like displaceable member inclined at a counterclockwise angle with respect to the substrate, and

wherein the displaceable member of said inner elastic beam is a plate-like displaceable member inclined at a clockwise angle with respect to the substrate.